

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/US2004/020704

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C08F291/00 C08F291/18 B01D71/28 B01D71/78 C08F259/08  
C08F255/02

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C08F B01D C08J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 359 019 B1 (STONE CHARLES ET AL) 19 March 2002 (2002-03-19) column 1, lines 5-22 column 2, line 25 - column 6, line 46; claims 1-39	1-12
X	----- WO 01/58576 A (BALLARD POWER SYSTEMS INC; STONE, CHARLES; STECK, ALFRED, E) 16 August 2001 (2001-08-16) page 1, lines 5-29 page 8, lines 20-26 page 12, lines 19-21 page 4, line 20 - page 12, line 21 page 13, line 19 - page 20, line 30; claims 1-62 ----- -/--	1-5,7-10

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

## \* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&amp;" document member of the same patent family

Date of the actual completion of the international search

25 May 2005

Date of mailing of the international search report

06 OCT 2005

Name and mailing address of the ISA

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 03/018654 A (BALLARD POWER SYSTEMS INC; STONE, CHARLES; BONORAND, LUKAS, M) 6 March 2003 (2003-03-06) page 4, line 19 - page 9, line 15; claims 1-58 * example *	1-5,7-11
X	----- US 4 113 922 A (D'AGOSTINO ET AL) 12 September 1978 (1978-09-12) column 4, lines 35-57 column 3, line 12 - column 5, line 20; claims 1-5; tables 1-6	1-5,7-10
P,X	----- WO 2004/026929 A (BALLARD POWER SYSTEMS INC; MACKINNON, SEAN, M) 1 April 2004 (2004-04-01) page 1, lines 5-8; claim 1 page 4, line 27 claims 10,30,31,39 page 7, lines 23-28; claims 15,1-46 page 4, lines 17-28 page 3, line 14 - page 5, line 5 page 7, line 14 - page 9, line 5	1-5,7-11
X	----- US 2002/137806 A1 (STONE ET AL) 26 September 2002 (2002-09-26) paragraphs [0001] - [0003] paragraphs [0015] - [0068]; claims 1-85	1-5,7-10
X	----- US 4 169 023 A (SATA ET AL) 25 September 1979 (1979-09-25) column 4, lines 18-55 * examples * column 3, line 3 - column 5, line 36	1-5,7-10
A	----- US 4 384 941 A (OKAMOTO ET AL) 24 May 1983 (1983-05-24) abstract column 2, line 32 - column 3, line 50; claims 1-7	1-12
A	----- US 4 481 306 A (MARKUS ET AL) 6 November 1984 (1984-11-06) abstract column 2, line 24 - column 4, line 23; claims 1-26	1-12
A	----- US 4 396 727 A (ISHIGAKI ET AL) 2 August 1983 (1983-08-02) claims 1-18	1-12
A	----- US 5 536 754 A (FEIRING ET AL) 16 July 1996 (1996-07-16) abstract; claims 1-12 column 1, line 5 - column 3, line 15 ----- -/--	1-12

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 03/006515 A (E.I. DU PONT DE NEMOURS AND COMPANY; BEKIARIAN, PAUL, GREGORY; FARNHAM) 23 January 2003 (2003-01-23) abstract; claims 1-34 page 1, line 30 - page 8, line 32 -----	1-12

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international application No.  
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## Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1 - 12

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

## FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

## 1. claims: 1-12

A fluorinated polymer suitable for ion exchange prepared by grafting at least one grafting monomer of formulae 1a or 1b, onto at least one base polymer as described in the application claim 1.

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## 2. claims: 13-17

An independent ion exchange membrane which is not dependent on any preceeding application claim. The said membrane comprising fluorinated polymer as described in application claim 13.

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## 3. claims: 18-31

An independent grafting process as described in application claim 18, which is not dependent on any previous application claim.

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## 4. claims: 32-39

An independent catalyst coated membrane comprising various surfaces as described in the application claim 32, and not dependent on any previous application claim.

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## 5. claims: 40-59

An independent membrane electrode assembly as described in the application claim 40, and not dependent on any previous application claim.

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## 6. claims: 60-72

An independent electrochemical cell as described in the application claim 60, which is not dependent on any previous application claim.

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6359019	B1	19-03-2002	AT 213006 T 15-02-2002
		AU 733804 B2 24-05-2001	
		AU 1017699 A 31-05-1999	
		CA 2309631 A1 20-05-1999	
		WO 9924497 A1 20-05-1999	
		DE 69803801 D1 21-03-2002	
		DE 69803801 T2 20-06-2002	
		EP 1034212 A1 13-09-2000	
		JP 2001522914 T 20-11-2001	
WO 0158576	A	16-08-2001	AT 278457 T 15-10-2004
		AU 3413400 A 20-08-2001	
		CA 2398836 A1 16-08-2001	
		DE 60014713 D1 11-11-2004	
		EP 1257348 A1 20-11-2002	
		JP 2003522224 T 22-07-2003	
WO 03018654	A	06-03-2003	WO 03018655 A1 06-03-2003
		CA 2458630 A1 06-03-2003	
		EP 1421125 A1 26-05-2004	
		EP 1421126 A1 26-05-2004	
		JP 2005500433 T 06-01-2005	
US 4113922	A	12-09-1978	NONE
WO 2004026929	A	01-04-2004	AU 2003266056 A1 08-04-2004
		CA 2499515 A1 01-04-2004	
		US 2004059015 A1 25-03-2004	
		US 2005165167 A1 28-07-2005	
US 2002137806	A1	26-09-2002	NONE
US 4169023	A	25-09-1979	NONE
US 4384941	A	24-05-1983	CA 1185558 A1 16-04-1985
		FR 2499594 A1 13-08-1982	
		GB 2094835 A 22-09-1982	
		JP 1370122 C 25-03-1987	
		JP 57131376 A 14-08-1982	
		JP 61034515 B 08-08-1986	
US 4481306	A	06-11-1984	WO 8300487 A1 17-02-1983
		DE 3248945 A1 03-11-1983	
		JP 4038762 B 25-06-1992	
		JP 58501232 T 28-07-1983	
US 4396727	A	02-08-1983	CA 1189018 A1 18-06-1985
		FR 2494126 A1 21-05-1982	
		GB 2088883 A 16-06-1982	
		JP 57085826 A 28-05-1982	
US 5536754	A	16-07-1996	US 5475143 A 12-12-1995
WO 03006515	A	23-01-2003	CN 1527851 A 08-09-2004
		DE 60202875 D1 10-03-2005	
		EP 1412401 A1 28-04-2004	
		JP 2004534892 T 18-11-2004	